Appl. No. 10/608,174
Amdt. Dated August 28, 2006
Reply to Office Action of June 26, 2006

AMENDMENTS TO THE DRAWINGS

The attached three sheets of drawings include changes to FIGS. 2, 3 and 5. In FIG. 2, previously omitted reference number 216 has been added. In FIGS. 3 and 5, previously omitted cross hatching has been added.

Attachment: 3 replacement sheets

REMARKS

This is a full and timely response to the Final Office action mailed June 26, 2006. Claims 1-21 are currently pending in the application. No claims have been amended. Claims 6, 16 and 20 have been withdrawn. Reexamination and reconsideration in view of foregoing amendments and following remarks is respectfully solicited.

Objections to the Drawings

In the first office action, the Examine objected to the drawings as inconsistent with the specification. Specifically, the Examiner stated that the drawings did not show a reaction wheel structure 216. In response, applicants have included a replacement sheet that adds the reference numeral 216.

In the first office action, the Examine objected to the drawings as not showing the proper hatchings in FIGS. 3 and 5. Specifically, the Examiner objected to a lack of cross hatchings in the bearing cartridge 308. Applicants have attached replacement sheets that add additional cross hatching to these FIGS. Applicants thus submit that this objection has been overcome.

Rejections under 35 U.S.C. § 102

Claims 1-5, 7, 8 were rejected under 35 U.S.C. § 102(b) as being anticipated by Perni et al (E.P. Patent No. 1,134,443), hereinafter "Perni"). Regarding claim 1, the Examiner stated that Perni teaches a damping spacer 22, a the spacer 22 coupled to bearings, in a momentum control device 2, the damping spacer 22 configured such that vibrations in the bearing 10 are absorbed by the piezodynamic damping spacer 22 and converted to electrical energy. The Examiner further stated that Perni disclosed a tuning system electrically coupled to the damping spacer, the tuning system providing selective control of a resonant frequency of the vibration damping device such that the vibration damping device absorbs vibrations in a selected frequency range.

In the previous response, applicants argued that Perni failed to disclose a piezodynamic damping spacer coupled to a bearing in a "momentum control device" as the term is defined in the specification and claims. In response to these arguments, the Examiner did not attempt to assert that Perni teaches a "momentum control device" as claimed. Instead, the Examiner cites a physics test book, and notes that a rigid body is subjected to angular momentum when it rotates about its axis. The Examiner then states that since Perni's device is for measuring and adjusting preload on bearings, and since it is inherently subjected to angular momentum, that it "reads on" the claimed "momentum device".

The Examiner further noted that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish from the prior art. Furthermore, the Examiner noted that if the prior art structure is capable of performing the intended use, it meets the claim. In this case, the Examiner alleged that Perni's device is useable in spacecraft in order to provide attitude control to spacecraft and other vehicles.

Applicants respectfully disagree, and again submit that Perni fails to teach a "momentum control device" as claimed, and thus fails to meet all the claimed limitations. First, applicants note that the Examiner cites element 2 of FIG. 1 in Perni as being a momentum control device. Applicants disagree, and note that element 2 of Perni is described as an "actuator device". Furthermore, element 2 is not described as itself rotating. Furthermore, even if element 2 was rotated, it would not qualify as a momentum control device as the term is defined and used in the specification.

As stated previously, applicants' specification defines momentum control devices as devices commonly used to provide attitude control on spacecraft and other vehicles. The attitude control is provided by controllable imparting torque on the vehicle. The specification further describes two specific types of momentum control devices, reaction

wheels and control moment gyroscopes. See paragraphs 0002 –0004 of applicants' specification.. See also claims 7 and 8, which specifically recite reaction wheels and control moment gyroscopes. Applicants note that both reaction wheels and control moment gyroscopes are well known attitude control devices. See http://en.wikipedia.org/wiki/Control_Moment_Gyroscope and http://en.wikipedia.org/wiki/Reaction_wheels for background information on reaction wheels and control moment gyroscopes.

In making this rejection the Examiner appears to be stating that since any device (i.e., element 2 of Perni) is subjected to angular momentum when it rotates about an axis, then element 2 of Perni is a momentum control device. Applicants respectfully disagree. First, applicants note that a momentum control device is not just "**subjected to** angular momentum" as alleged by the Examiner. Instead, they **controllable impart** torque to a vehicle. Thus, just because a device rotates and generates angular momentum it cannot be considered to be a "momentum control device" because the momentum is not **controllable imparted to the vehicle**. For example, there is no explanation in Perni of how any rotor could controllably be rotated to provide a desired amount of torque on a vehicle. Furthermore, **even if** the Examiner were correct that any rotating device could be considered a "momentum control device", it could not be similarly said that any rotating device is a reaction wheel or a control moment gyroscope, the two specific types of momentum control devices recited in the claims.

Applicants note with regard to claims 7 and 8, the final rejection states: "Regarding claim 7, the momentum control device 2 comprises a reaction wheel 2 (Fig. 1)." And "Regarding claim 8, the momentum control device 2 comprises a control moment gyroscope 2". Besides being contradictory, these statements are completely without support in the Perni reference. In fact, the Perni reference does not contain the words "wheel" or "gyroscope". Thus, there is no teaching in Perni of any "momentum control device" in general, or "reaction wheel" or "control moment gyroscope" in the

specific. Thus, applicants submit that the Examiner must withdraw the rejections based on the Perni reference for these reasons alone.

Furthermore, claim 1 recites that the vibration damping device includes a piezodynamic damping spacer "configured such vibrations in the bearing are absorbed by the piezodynamic damping spacer and converted to electrical energy" and a "turning system electrically coupled to the piezodynamic damping spacer, the tuning system providing selective control of a resonant frequency of the vibration damping device such that the vibration damping device absorbs vibrations in a selected frequency range". As described in applicants' specification, such a turning system can be implemented to optimize absorption of disturbances in specific frequency ranges. See applicants' specification at paragraph 0034 -0041 for several detailed examples.

In response to applicants' previous arguments, the Examiner alleged that Perni inherently discloses these features, as part of controlling the preload. The Examiner supports this by stating that vibration is proportional to load. Applicants again disagree, and again note that the claimed limitation is of a tuning system "providing selective control of a **resonant frequency of the vibration damping device**". There is no description in Perni that any resonant frequency exists, or that it could be controlled.

Thus, applicants submit that independent claim 1 is patentably distinct over the cited Perni reference. Furthermore, as claims 2-13 depend from, and include all the limitations of independent claim 1, they are also submitted to be patentably distinct.

Claims 1, 9-15, 17-19 and 21 were rejected under 35 U.S.C. § 102(b) as being anticipated by Kudo et al (U.S. Patent No. 6,286,374), hereinafter "Kudo"). Again, applicants respectfully disagree, and submit that independent claims 1, 14 and 18 are patentably distinct over the cited Kudo reference for several reasons. In the previous response, applicants argued that Kudo failed to disclose a piezodynamic damping spacer is coupled to a bearing in a "momentum control device" as the term is defined in the

specification and claims. As with the Perni reference discussed above, the Examiner did not attempt to assert that Kudo teaches a "momentum control device" as claimed. Instead, the Examiner cites a physics text book, and notes that a rigid body is subjected to angular momentum when it rotates about its axis. The Examiner then states that since Kudo's device is for measuring and adjusting preload on bearings, and since it is inherently subjected to angular momentum, that it "reads on" the claimed "momentum device".

Applicants again respectfully disagree, and submit that Kudo fails to teach a momentum control device for similar reasons as given above with respect to Perni. As stated previously, applicants' specification defines momentum control devices as devices commonly used **to impart torque and provide attitude control on spacecraft and other vehicles, with reaction wheels and gyroscopes being two primary examples.** The Kudo device is not a reaction wheel, a control moment gyroscope or any other type of momentum control device.

Second, claims 1, 14 and 18 recite that the vibration damping device includes a piezodynamic damping spacer, and a tuning the system coupled to the spacer. Applicants submit that Kudo fails to teach any such a tuning system.

In making the rejection, the Examiner cited column 6, line 18, to column 10, line 35 and claims 1-14 as teaching such a tuning system. Applicants again disagree. While this section describes resonant frequencies, it is generally referring to the resonant frequency of the bearings. **Kudo does not disclose controlling the resonant frequency of the vibration damping device such that vibrations are absorbed.** Thus, it does not describe the use of a tuning system to control the resonant frequency of the vibration damping device "such that the vibration damping device absorbs vibrations in a selected frequency range" as recited in claim 1. Nor does it teach the tuning system "adjusting the resonant frequency of the vibration damping device such that the vibration damping device efficiently absorbs vibrations in the measured frequency of the vibrations" as

recited in claim 14. Finally, it does not teach the tuning system "adjusting the resonant frequency of the vibration damping device such that the vibration damping device efficiently absorbs vibrations created by the momentum control device at the operational speed" as recite in claim 18.

In responding to applicants' previous arguments, the Examiner again alleges that these features are merely inherent results of the limitations of the claims. Applicants again disagree, and note that controlling the **resonant frequency of the vibration damping system** is not the same as controlling vibration in some general sense.

Thus, applicants submit that independent claims 1, 14 and 18 are patentably distinct over the cited Kudo reference. Furthermore, as claims 2-13, 15-17, and 19-21 depend from, and include all the limitations of their respective independent claims, they are also submitted to be patentably distinct.

In summary, none of the references cited by the Examiner nor any other known prior art, either alone or in combination, disclose the unique combination of features disclosed in applicant's claims presently on file. For this reason, allowance of all of applicant's claims is respectfully solicited.

In the office action, the Examiner **provisionally** rejected claims 1-5, 7, 8, 14 and 15 as being unpatentable over copending Application No. 10/608,176. Although the Examiner noted that the claims were not identical, the Examiner stated they were not patentably distinct. Applicants continue to disagree, but note that the claims of copending Application No. 10/608,176 have not yet been allowed, and that this remains a provisional rejection.

Conclusion

If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

If for some reason Applicant has not paid a sufficient fee for this response, please consider this as authorization to charge Ingrassia, Fisher & Lorenz, Deposit Account No. 50-2091 for any fee which may be due. This authorization is intended to act as a constructive petition for an extension of time, should an extension of time be needed as a result of this response.

Respectfully submitted,

INGRASSIA FISHER & LORENZ

Dated: 28 Aug 2006

By: _____

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